

$S_3 = \{s_1, s_2, \dots, s_6\}$: Multiplication Table

```
In[ ]:= s1 = {1, 2, 3};
        s2 = {2, 1, 3};
        s3 = {1, 3, 2};
        s4 = {3, 2, 1};
        s5 = {2, 3, 1};
        s6 = {3, 1, 2};
        s = {s1, s2, s3, s4, s5, s6};
```

```
In[ ]:= S3Apply[s_, v_] := Map[v[[#]] &, s]
```

```
In[ ]:= v0 = {A, B, C};
```

```
In[ ]:= sList = Map[S3Apply[#, v0] &, s]
```

```
Out[ ]:= {{A, B, C}, {B, A, C}, {A, C, B}, {C, B, A}, {B, C, A}, {C, A, B}}
```

```
In[ ]:= S3Mult[si_, sj_, v0_:v0] := Block[{v1},
        v1 = S3Apply[si, S3Apply[sj, v0]];
        Position[sList, v1][[1, 1]]
    ];
```

```
In[ ]:= Table["s" <> ToString@S3Mult[s[[i]], s[[j]]], {i, 1, 6}, {j, 1, 6}] // TableForm
```

Out[]//TableForm=

s1	s2	s3	s4	s5	s6
s2	s1	s6	s5	s4	s3
s3	s5	s1	s6	s2	s4
s4	s6	s5	s1	s3	s2
s5	s3	s4	s2	s6	s1
s6	s4	s2	s3	s1	s5

```
In[ ]:= Table["s" <> ToString[i] <> " s" <> ToString[j], {i, 1, 6}, {j, 1, 6}] // TableForm
```

Out[]//TableForm=

s1 s1	s1 s2	s1 s3	s1 s4	s1 s5	s1 s6
s2 s1	s2 s2	s2 s3	s2 s4	s2 s5	s2 s6
s3 s1	s3 s2	s3 s3	s3 s4	s3 s5	s3 s6
s4 s1	s4 s2	s4 s3	s4 s4	s4 s5	s4 s6
s5 s1	s5 s2	s5 s3	s5 s4	s5 s5	s5 s6
s6 s1	s6 s2	s6 s3	s6 s4	s6 s5	s6 s6